

I. AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions of claims in the application.

Listing of Claims:

- 1) (Currently amended) A natural language information extraction system for deriving information from a textual representation of a sentence, the sentence having a plurality of words, said system comprising:
 - a) an input for receiving data elements indicative of the textual representation of the sentence;
 - b) a processing unit coupled to said input, said processing unit being operative for processing the textual representation of the sentence to derive:
 - i. a parse tree group including a plurality of parse trees, each parse tree in said parse tree group including a word of the sentence, at least one parse tree including at least two words of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence, and;
 - ii. at least one noun phrase associated to a semantic type;said processing unit being operative for processing said parse tree group and said at least one noun phrase associated to a semantic type on the basis of a set of information extraction rules to derive an information record, the information record being indicative of a semantic representation of at least part of the sentence;
 - c) an output for releasing one or more data elements indicative of the information record.

- 2) (Currently amended) A natural language information extraction system as defined in claim 1, wherein said processing unit comprises:
- i. a morphological analyser for assigning to each word in the sentence a most likely morphological tag;
 - ii. a syntactic processor coupled to the morphological analyser, said syntactic processor being operative for generating said parse tree group including a plurality of parse trees, ~~each parse tree in said parse tree group including a word of the sentence, at least one parse tree including at least two words of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence;~~
 - iii. an information extraction unit for processing the plurality of parse trees to generate an information record on a basis of the set of information extraction rules.
- 3) (Original) A natural language information extraction system as defined in claim 2, wherein each information extraction rule in said set of information extraction rules includes a data element indicative of a parse tree pattern, said information extraction unit being operative to process the plurality of parse trees to extract a certain parse tree of said parse tree group, the certain parse tree matching the parse tree pattern.
- 4) (Original) A natural language information extraction system as defined in claim 2, wherein said morphological analyser is operative for:
- a) processing the textual representation of the sentence to assign a respective set of morphological tags to each word in the plurality of words;
 - b) assigning to each word an ambiguity class at least in part on the basis of the respective set of morphological tags;
 - c) identifying a most likely morphological tag to be associated to each word on the basis of a contextual rule, the contextual rule being associated to the respective ambiguity class assigned at step b).

- 5) (Original) A natural language information extraction system as defined in claim 2, wherein the syntactic processor is operative for:
- i. generating a parse tree for each word in the sentence and adding each generated parse tree to a parse tree group;
 - ii. generating a new parse tree on the basis of binary dependency rules applied to a given parse tree in the parse tree group, the new parse tree resulting from a combination of the given parse tree and another parse tree from the parse tree group;
 - iii. adding the new parse tree to the parse tree group.
- 6) (Currently amended) A method for deriving information from a textual representation of a sentence, the sentence having a plurality of words, said method comprising:
- a) receiving data elements indicative of the textual representation of the sentence;
 - b) processing the textual representation of the sentence to derive:
 - i. a parse tree group including a plurality of parse trees, each parse tree in said parse tree group including a word of the sentence, at least one parse tree including at least two words of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence, and;
 - ii. at least one noun phrase associated to a semantic type;
 - c) processing the parse tree group on the basis of a set of information extraction rules and the at least one noun phrase associated to a semantic type to derive an information record, the information record being indicative of a semantic representation of at least part of the sentence.
- 7) (Currently amended) A computer readable medium comprising a program element suitable for execution by a computing apparatus for deriving information from a textual representation of a sentence, the sentence having a plurality of words, said computing apparatus comprising:

- a) a processor, said program element when executing on said processor being operative for:
 - i. receiving data elements indicative of the textual representation of the sentence;
 - ii. processing the textual representation of the sentence to derive:
 - (a) a parse tree group including a plurality of parse trees, each parse tree in said parse tree group including a word of the sentence, at least one parse tree including at least two words of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence, and;
 - (b) at least one noun phrase associated to a semantic type;
 - iii. processing the parse tree group and the at least one noun phrase associated to a semantic type on the basis of a set of information extraction rules to derive an information record, the information record being indicative of a semantic representation of at least part of the sentence;
 - iv. releasing one or more data elements indicative of the information record.

8)-16) - (Cancelled)

- 17) (Currently amended) An apparatus for parsing a textual representation of a sentence to derive a parse tree group including a plurality of parse trees, the sentence including a plurality of words, the apparatus comprising:
- a) an input for receiving data elements indicative of the textual representation of the sentence;
 - b) a processing unit for processing the data elements indicative of the sentence to generate a parse tree group, said processing unit being operative for:
 - i. generating a parse tree for each word in the sentence and adding each generated parse tree to the parse tree group, wherein each parse tree in the parse tree group is formed of at least one node, and wherein ~~all of~~ at least

some of the nodes that form the parse tree are associated to a word in the sentence;

- ii. generating a new parse tree on the basis of binary dependency rules applied to a given parse tree in the parse tree group, the new parse tree resulting from a combination of the given parse tree and another parse tree from the parse tree group;
 - iii. adding the new parse tree to the parse tree group;
 - iv. wherein at least one parse tree in the parse tree group includes at least two nodes, each node of said at least two nodes being associated to a respective word of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence;
- c) an output for releasing a signal indicative of the parse tree group, said parse tree group being in a format suitable to be processed to derive a semantic representation of at least part of the sentence at least in part on the basis of the parse tree group.

18) (Cancelled)

19) (previously presented) An apparatus as defined in claim 17, wherein said apparatus is further operative for:

- a) extracting a given parse tree from the parse tree group, the given parse tree having a root node associated to a given word;
- b) processing a second parse tree, the second parse tree having a root node associated to a word that is a precursor to the given word to derive a dependency data element resulting from a combination of the given parse tree and the second parse tree;
- c) combining the given parse tree and the second parse tree at least in part on a basis of the dependency data element to generate the new parse tree.

20)(Original) An apparatus as defined in claim 19, wherein the given parse tree covers a first range of consecutive words in the sentence, the second parse tree covering a second range of consecutive words in the sentence, the second range of consecutive words being the immediate precursor of the first range of consecutive words in the sentence.

21)(Previously presented) An apparatus as defined in claim 17, wherein said apparatus is further operative for:

- a) extracting a given parse tree from the parse tree group, the given parse tree having a root node associated to a given word;
- b) processing a second parse tree, the second parse tree having a root node associated to a word that is a successor to the given word to derive a dependency data element resulting from a combination of the given parse tree and the second parse tree;
- c) combining the given parse tree and the second parse tree at least in part on the basis of the dependency data element to generate a new parse tree, the new parse tree forming the new parse tree.

22)(Original) An apparatus as defined in claim 17, wherein said apparatus is further operative for:

- a) searching the parse tree group for a parse tree that matches the new parse tree;
- b) adding the new parse tree to the parse tree group if no matching parse tree is found at step a).

23)(Currently amended) A method for parsing a textual representation of a sentence to derive a parse tree group including a plurality of parse trees, the sentence including a plurality of words, said method comprising:

- a) receiving data elements indicative of the sentence;
- b) processing the data elements indicative of the sentence to generate a parse tree group by:

- i. generating a parse tree for each word in the sentence and adding each generated parse tree to the parse tree group, wherein each parse tree in the parse tree group is formed of at least one node, and wherein at least some of all of the nodes that form the parse tree are associated to a word in the sentence, wherein at least one parse tree in the parse tree group includes at least two nodes, each node of said at least two nodes being associated to a respective word of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence;
- ii. generating a new parse tree on the basis of binary dependency rules applied to a given parse tree in the parse tree group, the new parse tree resulting from a combination of the given parse tree and another parse tree from the parse tree group;
- iii. adding the new parse tree to the parse tree group, wherein the parse tree group is suitable to be processed to derive a semantic representation of at least part of the sentence at least in part on the basis of the parse tree group.

24) (Currently amended) A computer readable medium comprising a program element suitable for execution by a computing apparatus for parsing a textual representation of a sentence to derive a parse tree group including a plurality of parse trees, the sentence including a plurality of words, said computing apparatus comprising:

- a) a processor, said program element when executing on said processor being operative for:
 - i. receiving data elements indicative of the sentence;
 - ii. generating a parse tree for each word in the sentence and adding each generated parse tree to a parse tree group, wherein each parse tree in the parse tree group is formed of at least one node, and wherein at least some of all of the nodes that form the parse tree are associated to a word in the sentence, wherein at least one parse tree in the parse tree group includes at

least two nodes, each node of said at least two nodes being associated to a respective word of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence;

- iii. generating a new parse tree on the basis of binary dependency rules applied to a given parse tree in the parse tree group, the new parse tree resulting from a combination of the given parse tree and another parse tree from the parse tree group;
- iv. adding the new parse tree to the parse tree group;
- v. releasing a signal indicative of the parse tree group in a format suitable to be processed to derive a semantic representation of at least part of the sentence at least in part on the basis of the parse tree group.

25)–36) (Cancelled)

37) (Currently amended) A natural language information extraction system for deriving information from a textual representation of a sentence, the sentence having a plurality of words, said system comprising:

- a) means for receiving data elements indicative of the textual representation of the sentence;
 - b) means for processing the textual representation of the sentence to derive:
 - i. a parse tree group including a plurality of parse trees, each parse tree in said parse tree group including a word of the sentence, at least one parse tree including at least two words of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence, and;
 - ii. at least one noun phrase associated to a semantic type;
- said means for processing being operative for processing said parse tree group and said at least one noun phrase on the basis of a set of information extraction rules to derive an information record, the information record being indicative of a semantic representation of at least part of the sentence;

c) means for releasing the information record.

38) (Previously presented) A natural language information extraction system for deriving information from a textual representation of a sentence, the sentence having a plurality of words, said system comprising:

- a) an input for receiving data elements indicative of the textual representation of the sentence;
- b) a processing unit coupled to said input, said processing unit being operative for processing the textual representation of the sentence to derive:
 - i. a parse tree group including a plurality of parse trees, wherein each parse tree in the parse tree group is formed from at least one node, all of the nodes forming the parse tree being associated to a word in the sentence, at least one parse tree including at least two words of the sentence, said at least one parse tree including a dependency data element describing a syntactic relationship between the at least two words of the sentence;

said processing unit being operative for processing said parse tree group on the basis of a set of information extraction rules to derive an information record, the information record being indicative of a semantic representation of at least part of the sentence;

- c) an output for releasing data elements indicative of the information record.

39) (Previously presented) A natural language information extraction system for deriving information from a textual representation of a sentence, the sentence having a plurality of words, said system comprising:

- a) an input for receiving data elements indicative of the textual representation of the sentence;
- b) a processing unit coupled to said input, said processing unit being operative for:

- i. generating a parse tree group including a plurality of parse trees, at least some parse trees including at least two words and a data element indicative of the syntactic dependencies between the at least two words;
 - ii. generating on the basis of the parse tree group a plurality of lexical frames, each lexical frame being associated to a respective word in the sentence, a certain lexical frame being associated to a certain word in the sentence and comprising a list of words of the sentence other than the certain word, each word in the list of words being associated to a dependency data element indicative of the syntactic relationship of each word in the list of words with the certain word;
 - iii. processing said plurality of lexical frames on the basis of a set of information extraction rules to derive an information record being indicative of a semantic representation of at least part of the sentence;
- c) an output for releasing data elements indicative of the information record.

40)(Previously presented) A natural language information extraction system as defined in claim 38, said processing unit being further operative for:

- a) processing the textual representation of the sentence to derive a noun phrase including a set of words;
- b) assigning to each word in the noun phrase a semantic type on the basis of entries in a semantics dictionary to derive a sequence of semantic typed words, the semantics dictionary including a plurality of entries, each entry being indicative of a word associated to at least one semantic type;
- c) processing the sequence of semantic typed words on the basis of a set of semantic rules to derive a semantic type associated to the noun phrase, the set of semantic rules describing how to attach a semantic type to a given noun phrase;
- d) releasing at an output said at least one noun phrase associated to a semantic type.

- 41) (Previously presented) A natural language information extraction system as defined in claim 40, wherein the set of semantic rules includes at least one rule based on the presence of a semantic type associated to a word in the noun phrase.
- 42) (Previously presented) A natural language information extraction system as defined in claim 40, wherein the set of semantic rules includes at least one rule based on the capitalization of words in the noun phrase.
- 43) (Previously presented) A natural language information extraction system as defined in claim 40, wherein the set of semantic rules includes at least one rule based on the presence of specific words in the noun phrase.
- 44) (Previously presented) A natural language information extraction system as defined in claim 40, wherein said at least one noun phrase is a first noun phrase and the semantic type of the at least one noun phrase is a first semantic type, said processing unit being further operative for:
- a) processing a second noun phrase to derive a second semantic type associated to the second noun phrase;
 - b) combining the first noun phrase with the second noun phrase to derive a compound noun phrase on the basis of joining rules;
 - c) assigning a third semantic type to the compound noun phrase;
 - d) releasing a signal indicative of the compound noun phrase associated with the third semantic type.
- 45) (Previously presented) A natural language information extraction system as defined in claim 44, wherein said joining rules are based on either one of the first semantic type and the second semantic type.
- 46) (Previously presented) A natural language information extraction system as defined in claim 44, wherein said joining rules are based on the semantic types of words in either one of the first noun phrase and the second noun phrase.

47) (Previously presented) A natural language information extraction system as defined in claim 44, wherein said joining rules are based on specific words in either one of the first noun phrase and the second noun phrase.

48) (Previously presented) A natural language information extraction system as defined in claim 44, wherein said processing unit is further operative for processing the compound noun phrase on the basis of the occurrence of incompatible semantic types within the compound noun phrase.

49) (New) A method as defined in claim 6, said method comprising:

- a) assigning to each word in the sentence a most likely morphological tag;
- b) processing the plurality of parse trees to generate an information record on a basis of the set of information extraction rules.

50) (New) A method as defined in claim 49, wherein each information extraction rule in said set of information extraction rules includes a data element indicative of a parse tree pattern, said method comprising processing the plurality of parse trees to extract a certain parse tree of said parse tree group, the certain parse tree matching the parse tree pattern.

51) (New) A method as defined in claim 49, wherein said method comprises:

- a) processing the textual representation of the sentence to assign a respective set of morphological tags to each word in the plurality of words;
- b) assigning to each word an ambiguity class at least in part on the basis of the respective set of morphological tags;
- c) identifying a most likely morphological tag to be associated to each word on the basis of a contextual rule, the contextual rule being associated to the respective ambiguity class assigned at step b).

52) (New) A method as defined in claim 49, wherein said method comprises:

- a) generating a parse tree for each word in the sentence and adding each generated parse tree to a parse tree group;
- b) generating a new parse tree on the basis of binary dependency rules applied to a given parse tree in the parse tree group, the new parse tree resulting from a combination of the given parse tree and another parse tree from the parse tree group;
- c) adding the new parse tree to the parse tree group.

53)(New) A computer readable medium as defined in claim 7, wherein said program element when executing on said processor being operative for implementation:

- a) a morphological analyser for assigning to each word in the sentence a most likely morphological tag;
- b) a syntactic processor coupled to the morphological analyser, said syntactic processor being operative for generating said parse tree group including a plurality of parse trees;
- c) an information extraction unit for processing the plurality of parse trees to generate an information record on a basis of the set of information extraction rules.

54)(New) A computer readable medium as defined in claim 53, wherein each information extraction rule in said set of information extraction rules includes a data element indicative of a parse tree pattern, said information extraction unit being operative to process the plurality of parse trees to extract a certain parse tree of said parse tree group, the certain parse tree matching the parse tree pattern.

55)(New) A computer readable medium as defined in claim 53, wherein said morphological analyser is operative for:

- a) processing the textual representation of the sentence to assign a respective set of morphological tags to each word in the plurality of words;
- b) assigning to each word an ambiguity class at least in part on the basis of the respective set of morphological tags;

- c) identifying a most likely morphological tag to be associated to each word on the basis of a contextual rule, the contextual rule being associated to the respective ambiguity class assigned at step b).
- 56) (New) A computer readable medium as defined in claim 53, wherein the syntactic processor is operative for:
- v. generating a parse tree for each word in the sentence and adding each generated parse tree to a parse tree group;
 - vi. generating a new parse tree on the basis of binary dependency rules applied to a given parse tree in the parse tree group, the new parse tree resulting from a combination of the given parse tree and another parse tree from the parse tree group;
 - vii. adding the new parse tree to the parse tree group.